4:45

767-4 Elevated Defibrillation Threshold When Right-Sided Venous Access is Used for Nonthoracotomy ICD Lead Implantation

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Because the defibrillation threshold (DFT) is related to the vector of energy delivery and amount of myocardium included in the shock field, we hypothesized that implantable defibrillator (ICD) leads implanted from the right side would yield higher DFTs than those implanted from the left. The database of the Endotak lead trial using a biphasic ICD (P2, CPI) was used to determine if the DFT depended on the site of venous access. The lead is a tripolar endocardial lead capable of bipolar sensing and pacing, and defibrillation using the lead alone (LA). The most commonly used models were the 0062 and 0064 leads (13 and 16 cm between the two defibrillation electrodes, respectively). The lead may be also linked to a subcutaneous/submuscular patch electrode (SQ/SM) using a Y-connector. Lead placement data were available from 595 (97.5%) of the 610 patients (pts) in the trial, and of those 345 (58%) had the DFT, defined as the lowest energy that was successful in terminating ventricular fibrillation, determined by a step-down protocol. There were 274 males and 71 females, with a mean age of 61 ± 13 years, and LV ejection fraction (LVEF) 0.33 ± 0.13. The cardiac disease was ischemic in 247 pts (72%), nonischemic cardiomyopathy in 74 pts (21%), and other etiologies in the rest. The endocardial lead was implanted from the left in 324 pts (93.9%) and the right in 21 pts (6.1%). There were no differences between the two groups with respect to gender, age, LVEF, or underlying cardiac disease. The mean DFTs (joules) were:

	LA ± SQ/SM	LA (all)	LA 0062	LA 0064
N	345	230	32	198
Left approach	9.9 ± 4.8	10.1 ± 5.0	10.6 ± 6.1	10.1 ± 4.8
Right approach	14.0 ± 7.3	14.6 ± 6.6	15.0 ± 0.0	14.5 ± 7.3
P value	0.02	<0.01	0.13	0.04

Conclusion: Nonthoracotomy ICD leads implanted from the right yield higher biphasic DFTs than those implanted from the left confirming the important influence that lead position and vector have on the DFT.

5:00

767-5 Differential Effects of Lidocaine on Defibrillation Threshold with Monophasic and Biphasic Waveforms

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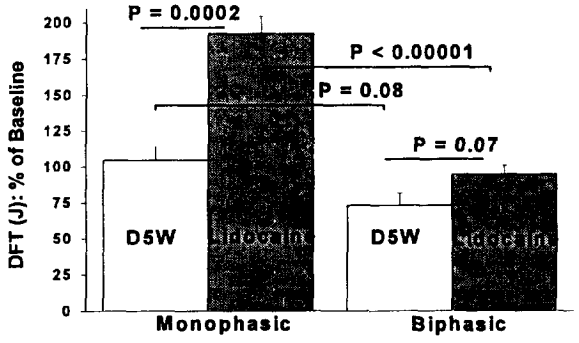
Antiarrhythmic drugs can interfere with electrical defibrillation using monophasic non-sequential shocks (MS). It is unknown if these drugs affect the efficacy of biphasic defibrillation shocks (BS). Since MS and BS waveforms can exhibit disparate effects on myocardial excitability and refractoriness (properties which may influence defibrillation efficacy), it is possible that antiarrhythmic drugs, such as lidocaine (L), will affect defibrillation threshold (DFT) of one waveform differently than another. We studied 25 pentobarbital anesthetized farm swine who had endocardial pacing and monophasic action potential catheters placed into the right ventricle. Pacing was used to induced sustained ventricular fibrillation (5–8 s) which was followed by defibrillation via epicardial electrodes. Each pig was assigned to one of four treatment groups; 1) MS + D5W (n = 7), 2) MS + L (n = 7) 3) BS + D5W (n = 5), or 4) BS + L (n = 7). DFTs were measured at baseline (Base) and subsequently during treatment (D5W or L). DFT values (joules) predicting 50% success at baseline were: MS + D5W = 7.34 ± 1.59, MS + L = 7.11 ± 1.5, BS + D5W = 5.28 ± 1.55 and BS + L = 3.86 ± 1.2. The figure depicts



treatment DFT values as percent of baseline. In the MS groups, the change in DFT from Base to L was 92 ± 28% vs the change from Base to D5W of 0.6 ± 29% ($p < 0.0001$). In the BS groups, however, the change in DFT from Base to L was similar to the change from Base to D5W (−6.7 ± 15 vs −29 ± 17%, $p = 0.08$). Compared to D5W, L increased DFT in the biphasic group by a magnitude that was $\frac{1}{4}$ that seen in the monophasic group. *Clinical Implications:* The effect of antiarrhythmic drugs on DFT (especially increased DFT values) may be less of a concern when using implantable devices employing biphasic waveforms.

5:15

767-6 Effect of Lead Polarity on the Defibrillation Threshold of Pectorally Implanted Cardioverter Defibrillators

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The effect of the polarity of the initial phase of a biphasic shock waveform on the defibrillation threshold (DFT) of cardioverter-defibrillators (ICDs) is not known. We tested this in two investigational pectorally implanted biphasic ICDs — Medtronic Models 7219C and 7219D PCD Jewel devices — in 22 consecutive patients (Pts). The 7219C has an "active can" and requires a single right ventricular (RV) lead while the 7219D requires RV and superior vena cava leads ± subcutaneous patch(es). The 7219C was implanted in 10 Pts and the 7219D in 12 Pts. Polarities were tested in random order. The results were:

	RV+*	RV−*	p value
7219C DFT	6.6 ± 3.1 J	10.8 ± 5.5J	0.007
Impedance	59.3 ± 8.8 Ω	60.3 ± 7.0 Ω	0.33
7219D DFT	12.0 ± 4.0 J	16.3 ± 7.3 J	0.07
Impedance	50.5 ± 6.7 Ω	47.5 ± 8.9 Ω	0.23

*Refers to the polarity of the initial pulse deflection

Of the 10 Pts receiving a 7219C device, 7 had lower DFT with RV+ while in 3 lead polarity had no effect. Of the 12 Pts receiving a 7219D device, 7 had lower DFT with RV+, 2 had lower DFT with RV−, and in 3 lead polarity had no effect. Overall, with RV+ there was a 39% reduction in DFT for Model 7219C and a 31% reduction for Model 7219D. An implant criterion of DFT ≤24J was met in 21 Pts using either RV+ or RV−. In one Pt, however, the DFT for RV− was 34J and for RV+ was 12J.

Conclusion: In this series, the lowest DFT was achieved most often using the RV+ polarity. These results suggest that both RV lead polarities should be tested to achieve the lowest DFT in Pts receiving a pectorally implanted ICD.

768 Unstable Angina: The Plaque and the Artery

Tuesday, March 21, 1995, 4:00 p.m.–5:30 p.m.
Ernest N. Morial Convention Center, Room 6

4:00

768-1 Coronary Lesion Histology in Stable, Unstable and Evolving Angina Pectoris

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We performed a histologic analysis of coronary lesions obtained by directional atherectomy from 100 patients with stable, unstable and evolving angina pectoris. Histologic analysis was performed by two pathologists unaware of the clinical history or angiographic findings. This included notation of the presence or absence of various matrix components and quantitative scoring (0–3+) of cellular lesion components. Forty-seven patients (47%) had native coronary lesions. Twenty-five patients (25%) had restenosis after previous balloon angioplasty and twenty-eight (28%) were treated for primary saphenous vein graft disease. There were no differences in the average histologic appearance of atherosclerotic lesions resulting in stable, unstable and evolving angina pectoris. Saphenous vein graft lesions were typically rich in dense connective tissue and extracellular lipid and mononuclear infiltrate. Restenosis lesions were rich in acid mucopolysaccharide and vascular smooth muscle cells and revealed no histologic differences according to the clinical syndrome. Native coronary artery lesions, from patients with unstable angina, more often contained organizing thrombi (30% vs 0%, $p < 0.05$), cholesterol crystals (20% vs 0%, $p < 0.05$) and harbored a more intense vascular smooth muscle cell infiltrate (2.1 vs 1.4, $p < 0.05$) when compared to lesions from patients with stable angina pectoris. There was no difference